International Review of Areas Where Activities are Restricted to Protect Deep Sea Corals

Prepared for

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Foreword

This report was commissioned by the Oceans and Coastal Management Division, Maritimes Region, Fisheries and Oceans Canada to provide a compilation of information on initiatives to protect deep sea corals around the world. The focus was on management measures used to protect deep sea coral habitats. The management of deep sea corals is a relatively recent endeavour and many of the management measures described are in the initial stages.

The report does not represent a formal review or an official position of Fisheries and Oceans Canada. For more information, please contact:

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Introduction

Purpose

The purpose for this report is to provide a detailed description of several protected areas around the world that have been set up in whole or in part to protect corals, with a particular emphasis on cold or deep water corals. The project focuses on the rationale for each area's design, the conservation measures in place, and the implementation of those measures.

Methods

Background information was collected using the internet, published literature, and existing materials at DFO (Oceans and Coastal Management Division). This was followed up by contacting government employees and other individuals involved with these efforts to learn from their experiences about the design of each area and how the restrictions are implemented and administered. After a preliminary internet search, it was decided that detailed summary tables would be completed for deep sea, or cold water coral protection initiatives off Alaska, Florida (Oculina Bank), Norway, Scotland (Darwin Mounds), Australia (Tasmanian Seamounts), New Zealand and two related sites around the Azores, Madeira and Canary islands.

Each table includes the following categories: size of protected area; size in relation to known coral habitat; type of protected area (i.e. marine reserve, trawling ban, etc.); legislation; corals/ecosystems protected; rationale for protection; zoning; restricted activities; planning/management process; effectiveness of protective measures; science and monitoring, compliance and enforcement; additional comments and sources of information and contacts.

General Observations

Much of the information was readily available on the internet, most notably for the Florida Oculina Banks and Tasmanian Seamounts protected areas. The Australia government sites are very user-friendly, easy to navigate, but tend to be short on contacts and recent updates. The information on the Oculina Bank fishery closure was assembled from several related websites but provided the most complete picture.

There was little information available on the effectiveness of protective measures as many of these protected areas have only recently been designated. There was usually an abundance of information describing the ecosystems at risk and the rationale for protection, which typically was to protect these ecosystems from bottom trawling. Most of these sites (Darwin Mounds, Norway, New Zealand, Azores/Madeira/Canaries, Alaska, Florida Oculina Bank) were essentially bans on certain types of fishing gear. Prohibitions were broader for the Tasmanian Seamounts and a single site off Norway, although other government agencies could impose restrictions through their own legislation on other activities such as oil and gas and mineral exploitation (see Norway and Darwin Mounds tables). Only the Australian sites (Tasmanian Seamounts and Lord Howe Island below) had any zoning in place which differentiated the types of activities permitted in specific areas. Most sites in the jurisdictions examined included buffers within their boundaries.

Australia seems to be the closest parallel to Canada in terms of the process used to identify and designate important areas for deep water corals. The two countries have federal (commonwealth) and state jurisdictions, government tends to be similar, aboriginal issues are important, and both countries tend to share similar interest groups. Australia however does have the advantage of having considerable experience in protecting the Great Barrier Reef and a number of other tropical coral reefs, thus being able to transfer this experience to cold water reefs.

Designation and management of the Darwin Mounds and Azores/Madeira/Canaries closures are complicated by two very different jurisdictions, the European Union and Member States. At times it proved difficult to understand just what each jurisdiction was responsible for. New Zealand does have some similarities to Canada however they are in the early stages of protecting cold water coral reefs. Norway has focused on fishery closures, and like Canada are in the early stages of designating a system of marine protected areas.

The United States is using a very different approach by allowing government agencies, such as NOAA, and the public to nominate candidate protected areas through a call for proposals. This has been a rather complicated approach, with some growing pains, but it does provide a formal mechanism for the public to nominate sites, and have them evaluated concurrently with sites nominated by government. This approach takes some of the authority out of government hands, leaves considerable authority within a fisheries management council, and has led to a considerable workload in terms of nominated sites. Fortunately, however, many of the sites overlapped. This approach could be examined again as the process gets closer to completion to see how successful it has been in protecting coral reefs.

Additional Sites

Other important areas for cold water corals are either being proposed for protection or are in the early stages of designation. Two sites are briefly summarized here. They were not added as separate tables as the sites off Ireland will have similar protection and management as the Darwin Mounds and the Lord Howe Marine Park is similar to the Tasmanian Seamounts.

Ireland

In December 2003, Ireland announced that 5 cold-water coral reefs off the west coast were to be designated as Special Areas of Conservation (SAC) under the EC Habitats Directive. The areas to be protected will include the Rockall Trough (Pelagia and Logachev mounds), the Perseverance and Propellor complexes on the Porcupine Ridge and the Therese mound on the Porcupine Seabight. The need for protection was heightened by the increasing threat from rapidly expanding deepwater trawling for orange roughy in the area (ICES 2003; Irish Press Release, 2003).

They sites are located at depths of 500 to 1200 m, between 80 and 240 km off the coast. They range from small structures of a few metres to larger mounds over 300 m in height. The sites are characterized by dense and rich coral communities dominated by the two framework-constructing species, *Lophelia pertusa* and *Madrepora oculata*, and other suspension feeders, especially sponges, gorgonians and crinoids. Mobile fauna included echinoderms,

crustaceans and various fish species. Evidence of fishing activity was confined to imaging of static gears (gillnets/tangle nets) used to fish for monkfish, anglerfish (*Lophius* spp.) and hake (*Merluccius merluccius*) lost on the side of mounds. However, trawl-marks have been imaged between mounds (ICES 2003).

The sites have been mapped (using sidescan sonar, digital stills and video) by a €27-million study of 400,000 km^2 of the country's seabed which the Geological Survey of Ireland has been carrying out since 1999. Protection and management of the sites will be similar to the Darwin Mounds off Scotland. See ICES (2003) for a map showing the distribution of these sites.

Lord Howe Island Marine Park – Australia

Lying at 31°30' S latitude, some 700 km north-east of Sydney, Lord Howe Island and Ball's Pyramid are part of a chain of seamounts that are the remnants of a once-extensive volcanic system active in the late Miocene. Due to its distance from any large landmass, the Island's marine ecosystem is largely in an undisturbed, natural state. The alternating influences of warm and cool currents create a transition zone between temperate and tropical regions that contributes to an unusual mix of tropical, sub-tropical and temperate marine fauna and flora and a high level of endemism. This includes more than 83 species of corals and 65 species of echinoderms of which 70 per cent are tropical, 24 per cent are temperate and 6 per cent are endemic. In 1982 the significance of Lord Howe Island and its marine environment was recognised by their addition to the UNESCO World Heritage List. The site was proclaimed as a Marine Park on June 21, 2000.

The island is part of the State of New South Wales (NSW) and is surrounded by State waters (out to 3 nm) and Commonwealth waters out to a distance of 200 nm. The combined area includes most of the marine areas of the World Heritage Property and forms the largest marine protected area off the NSW coast. The perimeter of the Lord Howe Island Marine Park (Commonwealth Waters) roughly corresponds to the 1800 m contour that follows the base of the seamounts that underlie the Island and Ball's Pyramid. The sea area of the Park is estimated to be 300,510 hectares and includes the seabed to a depth of 100 m.

Under the terms of the Offshore Constitutional Settlement between the Commonwealth and the States and Northern Territory, New South Wales has regulatory responsibility for the area out to 3 nm from Lord Howe Island and surrounding islets and rocks (State waters). The Park is a 'Commonwealth reserve' under the *Environment Protection and Biodiversity Conservation Act 1999*.

Within the Lord Howe Island Marine Park (Commonwealth Waters), the park is divided into 3 zones (see maps below):

- a Habitat Protection Zone (total 203,855 ha)
- two Sanctuary Zones (total 96,208 ha)

No fishing is permitted in the Sanctuary Zones. The Habitat Protection Zone allows some forms of commercial and charter fishing subject to a permit, and some forms of recreational fishing. All mining and petroleum activities are prohibited from all three zones.

One Sanctuary Zone extends to the east of Lord Howe Island southwards from latitude 31°30'4" S, in line with Malabar Point at the northern tip of the Island, to a latitude 31°35'50" S in line with King Point.

The other Sanctuary Zone lies to the south of Ball's Pyramid in line with the latitude 31°46'50" S that lies approximately 500 m north of South-west Rock, and extends to the outer boundary of the Park.

The primary objective of the Park is to protect the seamount system and its conservation values associated with marine biodiversity, habitats and ecological processes. Such protection will also ensure the long-term maintenance of the high quality marine environment important to the Island's tourism industry, as well as the traditions and lifestyle of the local community.

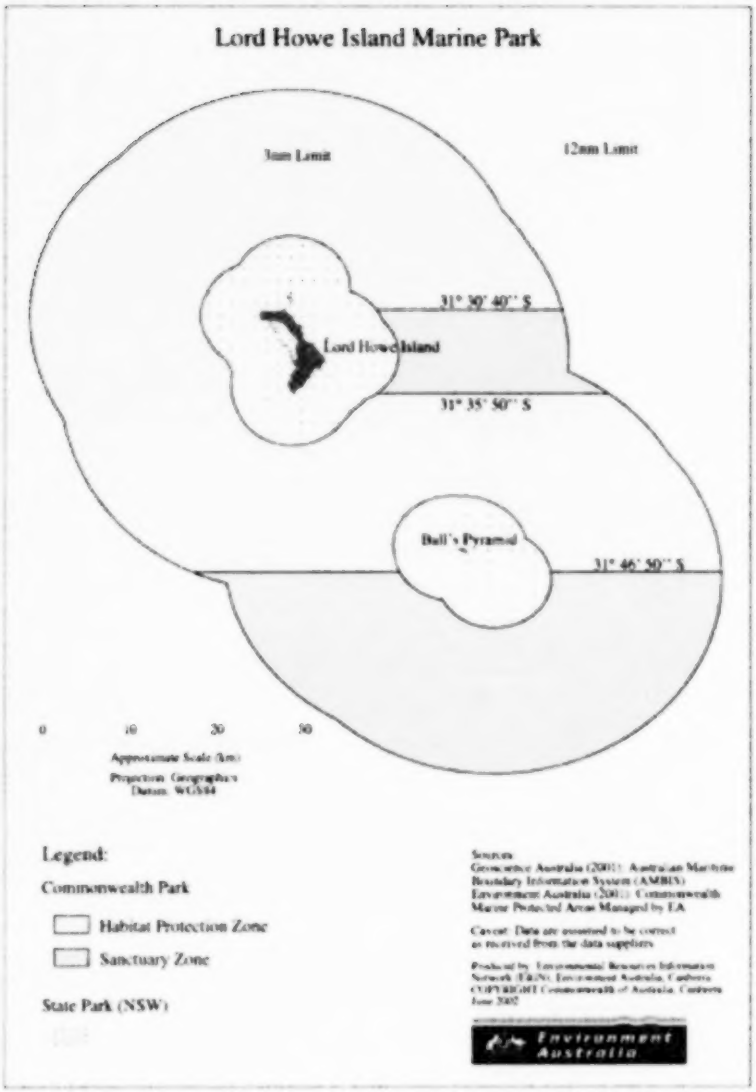
The Park Management Plan and associated fact sheets can be found at http://www.deh.gov.au/coasts/mpa/lordhowe/index.html.

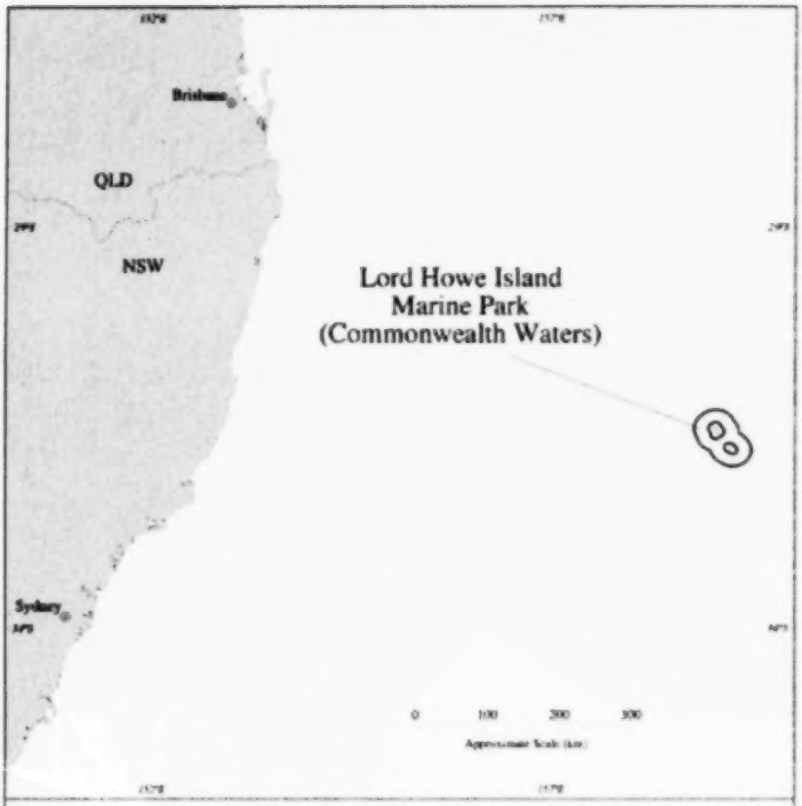
References

Environment Australia. 2002. Lord Howe Island Marine Park (Commonwealth Waters) Management Plan. Canberra, Au.

Government of Ireland Press Release. 2003. Ireland to protect its huge coral reefs. December 29, 2003. Available on ABC News website and www.iol.co.za websites.

ICES. 2003. Report of the Study Group on Cold-Water Corals. International Council for the Exploration of the Sea. Report ICES CM 2003/ACE:02.


Lord Howe Island Marine Park
3nm Limit
12nm Limit
31° 30' 40" S
Lord Howe Island
31° 35' 50" S
Ball's Pyramid
31° 46' 50" S
0
10
20
30
Approximate Scale (km)
Projection: Geographics
Datum: WGS84
Legend:
Commonwealth Park
Habitat Protection Zone
Sanctuary Zone
State Park (NSW)
Sources:
Geoscience Australia (2001): Australian Maritime Boundary Information System (AMBIS)
Environment Australia (2001): Commonwealth Marine Protected Areas Managed by EA
Caveat: Data are assumed to be correct as received from the data suppliers
Environment Australia



Lord Howe Island Marine Park (Commonwealth Waters)

LEGEND

Australian Exclusive Economic Zone (EEZ) and Territorial Sea

Marine Protected Area boundary

Caveat: Data is assumed to be correct as received from the data suppliers

Sources
Geoscience Australia (2001): Australian Maritime Boundary Information System (AMBIS)
Environment Australia (2001): Marine Protected Areas Managed by EA
ABS (1991): Populated Places (1991) Australia
Geoscience Australia (1998): TOPO-2.5M Topographic Data

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June 2002

Environment Australia

Site: Aleutian Islands, Gulf of Alaska - Alaska

Size of Protected Area	Size in Relation to Known Coral Habitat	Type of Protected Area	Legislation
Sitka Pinnacles Marine Reserve: 3.1 square nautical miles. Habitat Areas of Particular Concern (HAPC) – 10 sites proposed by NOAA which range from 4 to 45 square nautical miles. See table below for coordinates and the NOAA HAPC proposal (web site below) for maps.	Includes all known coral areas plus a buffer. The proposals identify the HAPC's as rectangular areas to facilitate management and enforcement. Circles or other shapes are possible for the buffer areas around the identified habitat features, but NOAA Fisheries Office of Law Enforcement recommended using rectilinear areas to facilitate enforcement.	Sitka Pinnacles – Marine Reserve All other sites are proposed HAPC. The HAPC proposals will go to the North Pacific Management Council for their decision.	*Magnuson-Stevens Act* establishes the national program for conservation and management of fishery resources. The law requires the minimization of adverse effects on essential fish habitat caused by fishing. Areas of special importance that may require additional protection may be designated as HAPC (Witherell and Coon 2000).

Corals/Ecosystems Protected	Rationale for Protection
Sitka Pinnacles: These pinnacles contain high relief habitat, including red tree corals, where lingcod and several species of rockfish aggregate. **Adak Canyon:** Large, geologically active submarine canyon. Eastern flank of the canyon is rich in corals and other sedentary invertebrates. The area contains a series of small coral gardens on the island arc slope between 150 m and 300 m depth. **Bobrof Island:** Area contains series of small coral gardens on the island arc slope between 150-250 m depth. **Cape Moffet:** Area contains series of small coral gardens on the island arc slope between 150-250 m depth. **Great Sitkin:** Area contains series of small coral gardens on the island arc slope between 300-365 m depth. **Semisopochnoi Island:** Submarine volcano. Coral garden habitat exists on	Corals are fragile, long-lived, and slow-growing. Some species are very susceptible to damage from anything that contacts them and will likely require long periods of time to recover from disturbance. Currently, these sites have been minimally affected by fishing disturbance. Coral habitat is generally located on high relief bedrock and coarse talus in areas where mobile bottom contact fishing gear (e.g. otter trawls) is seldom used. There was evidence, however, of disturbance consistent with that caused by longlining and pot longlining. Some derelict longline gear was observed in coral habitat. The proposed HAPCs would protect known coral garden habitats from disturbance to ensure their continued availability as refuge habitat for rockfish and other species.

Site: Aleutian Islands, Gulf of Alaska - Alaska

the west side of volcano from the summit (115 m) to a depth of 365 m. AFSC scientists suspect the entire undersea volcano is likely covered with coral garden habitat. Large Primnoa spp. colonies present at 365 m. **Ulak Island:** Area contains series of small coral gardens on the island arc slope between 150-250 m depth. **Cape Ommaney:** *Primnoa* sp. (red tree coral) colonies are concentrated on a series of small pinnacles. Several hundred colonies of red tree coral are located on bedrock and large boulders at depths between 201 and 256 m. **Dixon Entrance**: *Primnoa* sp. concentrations. Several hundred colonies of red tree coral located on scattered large boulders at depths between 150 and 380 m. Many colonies greater than 1 m in height. **Fairweather Grounds:** Series of dense *Primnoa* sp. concentrations. Red tree coral is located on scattered large boulders at depths between 150 and 200 m. High concentrations of *Primnoa* sp. also associated with small pinnacles.	
Zoning	**Restricted Activities**
None, buffers included in proposed HAPC sites.	The North Pacific Fishery Management Council (Council) adopted a regulation in April 2000 that defines corals and sponges as prohibited species. This was done to prohibit a full scale commercial fishery for gorgonian corals for the making of jewelry from developing. In 1991 longline fishermen and a group of concerned citizens proposed that all trawling be prohibited off southwest Alaska. This was ultimately adopted in 1998 as an amendment to the southeast Alaska groundfish management plan prohibiting trawling over a 52,600 square nautical mile area (Witherell and Coon, 2000). Sitka Pinnacles: All bottom gear types except pelagic gear used for salmon prohibited.

Site: Aleutian Islands, Gulf of Alaska - Alaska

	HAPC Aleutian Sites: All Council-managed fishing would be prohibited within the proposed HAPCs. Other potential management options might include VMS on all vessels, or prohibiting vessels from carrying bottom contact gear. HAPC Gulf of Alaska sites (Cape Ommaney, Dixon Entrance, Fairweather Ground): All Council-managed fishing except for near-surface salmon trolling would be prohibited within the proposed HAPCs. There are no proposed restrictions outside the boundaries of any of the proposed HAPCs.
Planning/Management Process	**Effectiveness of Protective Measures**
Proposed Fishing Prohibition. Buffers are incorporated into the proposed HAPC sites - The spatial configuration and size of the proposed buffer area at each site is based on the need to protect documented coral garden areas from stray fishing gear and from siltation caused by gear coming into contact with soft sediments in adjacent areas. Adjacent areas are likely to contain similar coral garden habitats given similarity in depth strata, substrate type, and current regime in those areas. The proposed HAPC's include habitats in state waters. For these proposed HAPC's to be effective, any new management measures developed by the Council would need to be coordinated with the Board of Fisheries to develop corresponding state regulations. Some longlining fishermen will be displaced, but NOAA argues that they may benefit in future years by enhanced recruitment of targeted species within the HAPC. A good overview of the HAPC selection process has been provided in a background document for the Plan Team Review. Much of this follows below.	Not applicable, as most sites have yet to be protected.

Site: Aleutian Islands, Gulf of Alaska - Alaska

An HAPC process was initiated in 1999 by the NPFMC and NMFS. The first HAPC process involved a series of stakeholder workshops to identify HAPC areas and fishery issues. Meetings were held throughout Alaska. A summary report was offered to the Council and the Council chose not to take further action on HAPC. The broad HAPC descriptions remain current until an Essential Fish Habitat (EFH) EIS and HAPC process become final.

Current HAPC Process

With the development of the 2004 EFH Draft EIS, a process to identify HAPC's was developed through the Council and in cooperation with NMFS Alaska Region. The process includes an initial call for proposals to identify HAPC's and any associated management measures. Over 20 HAPC proposals were received covering a broad range of EFH habitats and geographic areas. Further, the process includes a subsequent Plan Team review and assessment which will include a ranking of the areas and decisions as to the ecological, socio-economic, and practicability merits of the proposals. The HAPC process parallels the EFH EIS timeline, including regulatory action, to be completed by August 13, 2006.

HAPC Consideration vs. EFH EIS Determinations

The draft EFH EIS concludes no new action is necessary to minimize the effect of fishing on EFH. Given HAPC's are subsets of EFH, "how do we explain why we are considering HAPC areas as a management action to limit habitat disturbance caused by fishing"? The EIS acknowledges that there are long-term effects of fishing on benthic habitat features off Alaska, and that considerable scientific uncertainty remains regarding the consequences of such habitat changes for managed species.

Nevertheless, the analysis concludes that the effects on EFH are minimal because there is no indication that continued fishing at the current rate and intensity would alter the capacity of EFH to support healthy populations of managed species over the long term. The EIS therefore finds that no Council-managed fishing activities have more than minimal and temporary adverse effects on EFH, which is the regulatory standard requiring action to minimize effects under the Magnuson-Stevens Act. However, the EIS notes that a variety of management actions could be taken to provide additional

Site: Aleutian Islands, Gulf of Alaska - Alaska

habitat protection, should the public and Council decide on a process to do so.	
Science/Monitoring	**Compliance/Enforcement**
Detailed ecological studies have not been conducted. Archived submersible video documentation will allow scientists to monitor the establishment of new colonies and recovery of damaged habitat, and document changes in the abundance of commercial fish species over time.	Not developed - The NOAA Fisheries Office of Law Enforcement notes that management measures will be much easier to enforce if all fishing is prohibited in the proposed HAPCs. Other enforcement mechanisms may include using VMS on all vessels.
Additional Comments	**Contacts/Web Sites**
The 25 HAPC proposals submitted in January 2004 can be viewed at http://www.fakr.noaa.gov/npfmc/current_issues/efh/HAPC_proposals/Ann_agenda.pdf A HAPC proposal was submitted by the Alaska Marine Conservation Council to protect the Adak Canyon. This proposal had similar justification as NOAA's, but the proposed protected area was larger. The Marine Conservation Alliance also submitted proposals for approximately 10 sites, including some proposed by NOAA. Another HAPC proposal was submitted by three trawl (dragger) associations to protect a site off the Aleutians. These organizations promoted zoning to provide for fishing areas and for control areas for research and monitoring. It would result in some fishing at the site. As of early May, the HAPC proposals were merged and narrowed down to 16 "possible alternatives for analysis" that are undergoing further evaluation before the NPFMC determines which "final alternatives" will undergo a full environmental and economic analysis. The EA will be started in June, with a completed draft expected between October and December depending on how many alternatives and options are selected (C. Coon, email 2004, D. Witherell, email 2004). From the documents findings the NPFMC may then choose which actions may need to have management measures associated with them (closures).	Good general information, especially on the Sitka Pinnacles and "Legislation" section above, was taken from Witherell, D., and C. Coon. 2000. Protecting Gorgonian Corals off Alaska from Fishing Impacts. First International Symposium on Deep Sea Corals, Halifax, N.S. David Weatherell (David.Weatherell@noaa.gov), NOAA and Cathy Coon (cathy.coon@noaa.gov), NOAA provided emails on the HAPC process. Another contact is Bob Stone, NOAA, (907) 789-6031. NOAA Essential Fish habitat draft EIS: http://www.fakr.noaa.gov/habitat/seis/efheis.htm Much of the remaining information was compiled from 2 NOAA HAPC proposals – Aleutian Islands (first 6 sites in table below) and Gulf of Alaska (last 4 sites in table). All the HAPC proposals can be found at: http://www.fakr.noaa.gov/npfmc/current_issues/efh/HAPC_proposals/HAPCproposals.htm Two particuiarly useful NOAA websites include: www.fakr.noaa.gov and www.afsc.noaa.gov. The first site provides the most recent updates on the HAPC selection process.

Site: Aleutian Islands, Gulf of Alaska - Alaska

However under the Essential Fish Habitat Provisions, HAPC are not required to have closures associated with them, they could only have a designation applied to them, which effectively does nothing. If they do choose to do something with a management measure associated with it, it won't be into the regulations until August 2006 (C. Coon, email, 2004). Most of the areas proposed would be evaluated for possible closure to all bottom fishing gear, or just closure to bottom trawling. The final decision on the HAPC area identification and protection measures will occur in February 2005. Measures would be implemented in 2006 (D. Witherell, two emails, 2004).	The Alaska Marine Conservation Council also has an informative website: www.akmarine.org

Proposed Habitat Areas of Particular Concern (HAPC) – NOAA

Site Name	Latitude	Longitude	Area
Adak Canyon (Aleutian Islands)	51.6500 N 51.6500 N 51.5000 N 51.5000 N	177.0500 W 177.0000 W 177.0000 W 177.0500 W	9 nm by 2 nm (18 nm^2)
Bobrof Island (Aleutian Islands)	51.9600 N 51.9600 N 51.8600 N 51.8600 N	177.4900 W 177.3300 W 177.3300 W 177.4900 W	5.5 nm by 5.5 nm (30.2 nm^2)
Cape Moffet (Aleutian Islands)	51.9300 N 51.9300 N 51.9700 N 52.0000 N 52.0000 N	176.8800 W 176.8100 W 176.7800 W 176.7800 W 176.8800 W	4.2 nm by 3.8 nm (16.0 nm^2)

Great Sitkin (Aleutian Islands)	52.1600 N 52.1600 N 52.1100 N 52.0800 N	176.2100 W 176.1000 W 176.1000 W 176.2100 W	4.0 nm by 4.0 nm (16 nm^2)
Semisopochnoi Island (Aleutian Islands)	51.8900 N 51.8900 N 51.8100 N 51.8100 N	179.8900 W 179.7800 W 179.7800 W 179.8900 W	4.0 nm by 4.0 nm (16.0 nm^2)
Ulak Island (Aleutian Islands)	51.3700 N 51.4300 N 51.3700 N 51.4300 N	178.9800 W 179.1000 W 179.1000 W 178.9800 W	4.5 nm by 3.4 nm (15.3 nm^2)
Cape Ommaney (Gulf of Alaska)	56.2100 N 56.1600 N 56.1600 N 56.2100 N	135.1300 W 135.1300 W 135.0900 W 135.0900 W	3.3 nm x 1.2 nm (4.0 nm^2)
Dixon Entrance (Gulf of Alaska)	54.6300 N 54.5600 N 54.6300 N 54.5600 N	133.1800 W 133.1800 W 132.8700 W 132.8700 W	10.9 nm x 4.2 nm (45.8 nm^2)
Fairweather Ground NW Area (Gulf of Alaska)	58.4700 N 58.3700 N 58.3700 N 58.4700 N	139.3300 W 139.3300 W 139.2600 W 139.2600 W	6.2 nm x 2.1 nm (13.0 nm^2)
Fairweather Ground Southern Area (Gulf of Alaska)	58.2600 N 58.2600 N 58.2200 N 58.2200 N	138.8600 W 139.1500 W 139.1500 W 138.8600 W	9.3 nm x 2.5 nm (23.3 nm^2)

Site: Azores (Portugal), Madeira (Portugal) & Canary Islands (Spain)

Size of Protected Area	Size in Relation to Known Coral Habitat	Type of Protected Area	Legislation
See map and coordinates below.	These areas encompass nearly all known coral habitat in the area.	Site designated as a "Habitat of Community Interest" by European Commission (EC), but site can best be described as a fisheries closure.	Proposed amendment to EC Regulation 850/98 for protection of fishery resources.

Corals/Ecosystems Protected	Rationale for Protection
Lophelia pertusa has been recorded off the Canary Islands and at several sites at depths greater than 1000 m around Madeira and the Azores. The continental shelf around the islands is very narrow or virtually non-existent. Several habitats are present including deepwater coral aggregations, thermal vents and carbonate mounds which give shelter and food to a highly diversified fauna and flora. These habitats support a wide diversity of marine life, including commercial fish species such as mora, black scabbard fish and orange roughy – species which are exploited on the nearby high seas.	According to the EC, scientific evidence, including reports from the International Council for the Exploration of the Sea (ICES), shows that habitats such as those found around the islands are in need of special protection, especially against the physical damage caused by bottom trawls and similar fishing gear.
Zoning	**Restricted Activities**
None	Ban on bottom trawling. No other restrictions. The proposed ban will not adversely affect fishermen as bottom trawling is currently prohibited and other types of fishing gear will continue to be allowed in the areas concerned (EC Press Release 2004).
Planning/Management Process	**Effectiveness of Protective Measures**
No information available for these sites, however it will likely follow the EC document "Setting out a Community Action Plan to integrate environmental protection requirements into the Common Fisheries	There is no specific information on this site. On a more general note, the EC will submit before December 31, 2005 a report to the Council and the European Parliament on the environmental performance of the CFP

Site: Azores (Portugal), Madeira (Portugal) & Canary Islands (Spain)

Policy (CFP)" (COM (2002)186, web link below). Highlights are listed below: • the EC will progressively implement an ecosystem-based approach to fisheries management; • the Commission will extend management measures to the protection of noncommercial species and habitats from the effects of fishing; • a Community framework for the collection and management of data will be established – Member States should initiate studies and pilot projects regarding the collection of basic • information on the relationships of fisheries with the environment; • the Commission and Member States should collaborate closely to progress in implementing programs for integrated coastal zone management; and • the Commission and Member States should pay special attention to keeping stakeholders and the wider public well informed.	based on the monitoring programs outlined in "Science/Monitoring" below.
Science/Monitoring	**Compliance/Enforcement**
Site specific information was unavailable. General guidance for all fishery areas, as provided EC (2002) follows: • The process of integration of environmental protection requirements within the CFP should be monitored by means of a system based on indicators. In order to implement such a system, the Commission will consult the Scientific, Technical and Economic Committee for Fisheries (STECF) to define preliminary indicators of the environmental performance of fisheries management. On the basis of STECF advice, the Commission will design an experimental monitoring system based on such indicators, to become operational during 2003; • Member States are invited to "stimulate the study of the performance of the above-mentioned monitoring system" to deliver relevant information for the CFP, with a view to developing a more comprehensive monitoring system including	The large areas covered by the trawling ban and limited local resources make inspection and monitoring of fisheries activities extremely difficult. On a general note, the Commission has listed a number of broader initiatives for similar sites: • The EC will consider the use of trade measures to promote sustainable and environmentally-sound fishing practices; Member States and the Commission will consider the potential for eco-labels to stimulate environmentally sound fishing practices; and • Whenever human activities not covered by the CFP are proven to have an harmful impact on the marine environment likely to result in decreased productivity and fish yields or in the quality and fitness of catches or aquaculture production, the Commission and Member States should call the attention of the appropriate authorities to the problem with a view to remedial

Site: Azores (Portugal), Madeira (Portugal) & Canary Islands (Spain)

benchmarks and indicators of driving forces, pressure, state, impact and response (DPSIR).	action.
Additional Comments	**Sources**
Bottom trawling is currently banned in these areas under the rules governing access to the 'western waters', established during the process of integrating Portugal and Spain into the EC Common Fisheries Policy. As these rules will end in 2004, restrictions are needed to ensure continued protection for these habitats. The EC proposes therefore to modify the 1998 Council Regulation on technical measures which establishes technical conditions related to gear specifications, seasonal and spatial restrictions and other technical conservation measures. Legislation on trawling which is binding to all vessels can only be issued by the Council of the European Union following a proposal by the European Commission. Enforcement and research is for the relevant Member States but this can benefit from financing assistance by the European Union (Astudillo, EC, email 2004). Similar restrictions currently apply to the Darwin Mounds off Scotland which also boasts similar sensitive habitats.	EC Press Release IP/04/153; Proposal for a Council Regulation 2004/0020 (CNS); EC COM (2002)186 Final (see "Planning Process" above). Available at http://europa.eu.int/comm/fisheries/ EC: Setting out a Community Action Plan to integrate environmental protection requirements into the Common Fisheries Policy. Available at http://europa.eu.int/comm/fisheries/doc_et_publ/factsheets/legal_texts/docscom/en/com_02_186_en.pdf AquaNews – Vancouver Aquarium Aquatic Environmental News Network – posted 02/04/04. http://www.vanaqua.org/ WWF News Releases - http://www.panda.org/news_facts/newsroom/ Contacts that provided information via email include Peter Bryant (pbryant@wwfint.org) and Stephan Lutter (lutter@wwfneap.org), WWF, and Armando Astudillo, Armando.Astudillo@cec.eu.int from the EC. Other contacts suggested by Stephan Lutter include Gui Menezes (GuiMenezes@notes.uac.pt) from the University of the Azores and Ms. Dinah Sobral, Ministry of Cities, Land Planning and Environment - Institute of Nature Conservation, Rua Ferreira Lapa, 38-4° dto, P-1169-138 Lisboa PORTUGAL, Tel: 00 351 21 316 05 20, Fax: 00 351 21 352 04 74, E-mail: sobrald@icn.pt. A possible contact for Spain would be Mr. Javier Pantoja, Directorate General of Nature Conservation, Ministry of Environment, Gran Via de San Francisco 4, E-28005 Madrid, Spain. Tel: 00 34 91 596 46 11, Fax: 00 34 91 596 48 09, e-mail: JPantoja@mma.es who was head of the Spanish delegation at a recent meeting of the OSPAR Convention Biodiversity Committee.

Coordinates: Vessels shall be prohibited from using any bottom trawl or similar towed nets operating in contact with the bottom of the sea in the areas bounded by a line joining the following coordinates:

a) area named "Madeira and Canaries"
Latitude 27° 00' N longitude 19° 00' W
Latitude 26° 00' N longitude 15° 00' W
Latitude 29° 00' N longitude 13° 00' W
Latitude 36° 00' N longitude 13° 00' W
Latitude 36° 00' N longitude 19° 00' W

b) area named "Azores"
Latitude 36° 00' N longitude 23° 00' W
Latitude 42° 00' N longitude 23° 00' W
Latitude 42° 00' N longitude 34° 00' W
Latitude 36° 00' N longitude 34° 00' W

Site: Darwin Mounds - Scotland

Size of Protected Area	Size in Relation to Known Coral Habitat	Type of Protected Area	Legislation
See maps below. The corner coordinates for the site are: 59° 54' N 7° 39' W 59° 54' N 6° 47' W 59° 37' N 6° 47' W 59° 37' N 7° 39' W The mounds cover an area of no more than 169 km^2, while the area referred to in the EC proposal covers close to 1530 km^2. This is due to inclusion of a buffer (see next column) and the formation of a legally definable rectangle.	All known coral habitat will be protected. The trawling ban protects two main mounds, an extended field of smaller mounds and a minimum 2.2 km margin surrounding the area. The buffer is to protect the area from adjacent bottom trawling.	Mounds designated as a "Habitat of Community Interest" by European Commission (EC), but site can best be described as an EC fisheries closure.	On 20 August 2003, the European Commission issued an emergency Regulation (1475/2003) to protect the Darwin Mounds under Article 7 of the European Union Common Fisheries Policy (CFP) Regulation (2371/2002). The Commission can use emergency measures if there is evidence of a serious threat to the marine ecosystem resulting from fishing activities. The measure closed the area to all bottom-trawl or similar towed nets for a six-month period, with the option for a further six-month closure. The Regulation followed a direct request from the UK Government. The UK is intending to designate the Darwin Mounds a Special Area of Conservation (SAC) under the European Habitats Directive.

Corals/Ecosystems Protected	Rationale for Protection
Discovered in 1998, the Darwin Mounds are a unique collection of cold-water coral mounds at a depth of 1000 m, about 185 km northwest of Scotland. The mounds are up to 100 m in diameter and five m in height, have a pronounced tail, and acoustic surveys have shown that many of the mounds are topped with coarse material.	The most recent study of the reef has shown what would appear to be the damaging effect of demersal trawling. High frequency sonar observations show seabed lineations and parallel scar marks, some tracking directly through the Mounds. Damage was visible across about half of Darwin Mounds East. Other studies have recorded smashed and

Site: Darwin Mounds - Scotland

There are two main fields, referred to as Darwin Mounds East (13 km x 4 km with about 75 mounds) and West (13 km x 9 km with about 150 mounds). Subsequent studies show the "mound features" covering an area larger than the two main fields but at a lower density. Photographic surveys have shown that this coarse material is either coral thickets or coral rubble. The main coral species forming the thickets is *Lophelia pertusa* but *Madrepora oculata* is also known to be present. These thickets of cold water corals represent a type of 'reef', which the UK is obliged to designate and protect under the EU Habitats Directive 92/43/EEC (JNCC 2003). The mounds are also remarkable in that *Lophelia pertusa* appears to be growing on sand rather than hard substratum. Prior to research on the mounds in 1998 and 1999, it was thought that *L. pertusa* required a hard substratum for attachment (Defra (Department for Environment, Food and Rural Affairs) – Annex A, 2003). The reefs support a wide diversity of marine life, such as sponges, starfish, sea urchins, crabs and deep-sea fish such as the blue ling, round-nosed grenadier and the orange roughy (WWF Press Release 2003).	damaged coral over significant areas of the Mounds and a reduction in biodiversity. Much of this damage is said to be permanent and was at risk of being compounded before the imposition of the Commission emergency measures. The need for protection was deemed by the EC to be "unequivocal" (EC Session Report A5-0019/2004). The Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention) has recently included deep-water coral reefs in a list of endangered habitats. The UK requested that emergency measures be adopted by the EC, who responded with the conclusion that "in the light of the evidence provided by the United Kingdom, it must be concluded that the conservation of the habitat in question is under serious threat and that immediate action is required". Possible interests in oil and gas exploration and carbonate extraction pose further risks to the Mounds. See "Restricted Activities" below for UK initiatives to protect the Darwin Mounds from these activities.
Zoning	**Restricted Activities**
None	Vessels are prohibited from using bottom-trawl or similar towed nets operating in contact with the bottom of the sea. The EC has concluded that since the ban only affects specific types of fishing activity within a relatively small area, effects on the fishery and related industries should be minimal. The Joint Nature Conservation Committee (JNCC) has provided additional information related to oil and gas activities, which falls within UK jurisdiction: Prior to licensing areas for oil and gas exploration a detailed Strategic Environmental Assessment (SEA) will be undertaken

Site: Darwin Mounds - Scotland

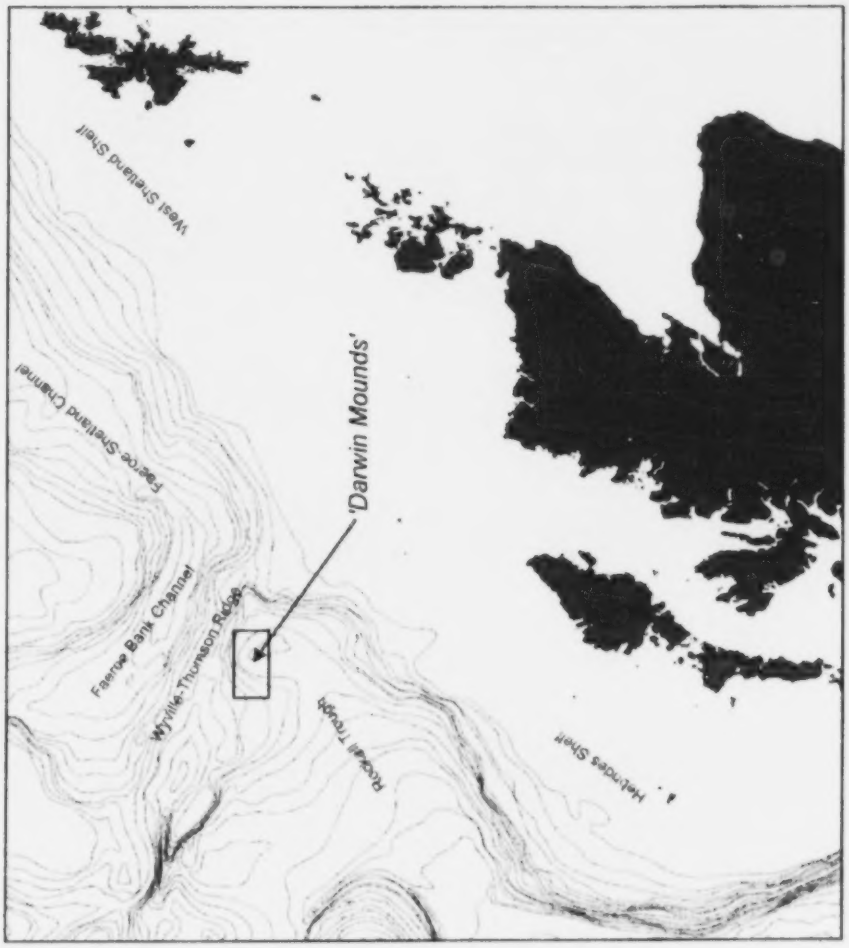
	to allow the Department of Industry (DTI) to take into account any locations which should not be licensed for environmental or other reasons. SEA 1, undertaken in 2000 prior to the 19th Offshore Oil and Gas Licensing Round, identified the Darwin Mounds as an area that should not be licensed and hence the surrounding blocks were not released for licensing by the DTI. In addition to this protection, any oil and gas operation which may occur with the potential to impact upon the Darwin Mounds (there are existing licenses in the proposed SAC, see Section 4.6 of the UK Department for Environment, Food and Rural Affairs (Defra) Regulatory Impact Assessment) would be subject to regulation under the terms of the Offshore Petroleum Production and Pipelines (Assessment of Environmental Effects) Regulations 1999 and The Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001. These regulations require the DTI to take into consideration environmental information before making decisions on whether or not to authorize various offshore projects. Oil and gas companies proposing operations submit an environmental impact assessment to the DTI which will be reviewed by the DTI's own environmental managers and DTI's statutory consultees including JNCC. In addition, any activity that is likely to have a significant impact upon a proposed or designated Special Area of Conservation such as the Darwin Mounds are subject to further scrutiny through the appropriate assessment procedure.
Planning/Management Process	**Effectiveness of Protective Measures**
There have been calls from both NGOs and the EC for the UK Government to designate the Darwin Mounds as a SAC (Special Area of Conservation) under the EC Habitats Directive to allow the EC to permanently protect the site from bottom trawling. The UK has passed the Conservation Regulations (1994) to transpose the EC Habitats Directive into domestic legislation. This was taken a step further (after a successful challenge by Greenpeace) by the preparation of the draft Offshore Marine Conservation Regulations	Unknown at present. The EC will submit to the Council and the European Parliament (before December 31 2005) a report on the environmental performance of the CFP based on the monitoring programs outlined in "Science/Monitoring" below. In addition to this, there will be an obligation on the UK to monitor the site to provide a status assessment to the European Commission every six years (as with every Special Area of Conservation).

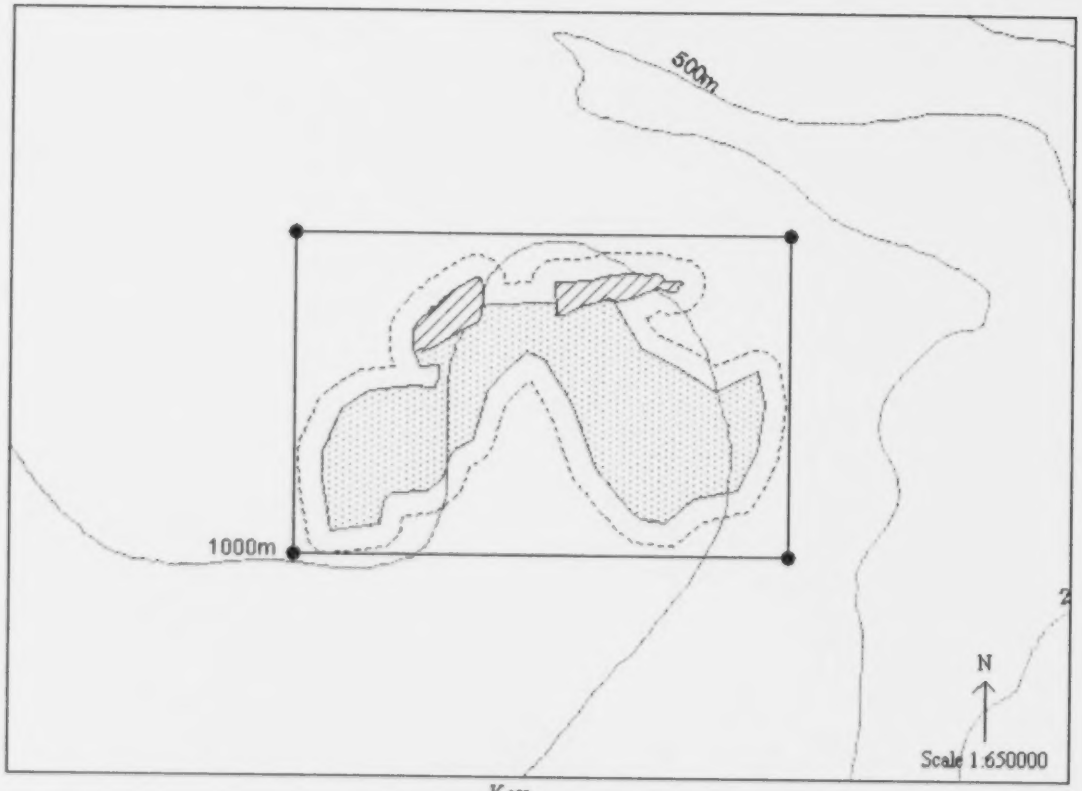
Site: Darwin Mounds - Scotland

(2003) to apply to all activities which the UK has competence to legislate on the UK Continental shelf. The UK will therefore be responsible for the management of the Darwin Mounds SAC. Upon the designation of the Darwin Mounds as a SAC, conservation objectives for the site will be formally set out by the UK and a management plan devised to fulfill those objectives. This has not yet been done although the key management measure, prevention of bottom trawling, has been achieved through the EC. Precisely who in the UK is responsible for the management of the site is unclear since legislation to designate SACs in waters beyond the territorial seas has not been completed. However, it is likely to be one of or a combination of Defra (See "Enforcement" below) or the Joint Nature Conservation Committee (JNCC). Consultation has already been carried out in anticipation of the site being put forward for designation as a SAC (see Defra website below). Consultation has also been carried out by the European Commission with relevant fisheries representatives of Member States on the measure under the CFP to prevent bottom trawling. The EC has also recommended that the UK ensure that the fishing industry and future Regional Advisory Councils are consulted meaningfully during the development of a Management Plan. The situation highlights the cooperative nature of any action taken to conserve areas of the seabed beyond territorial waters in Europe (Carolyn Turnbull, JNCC, email, 2004).	
Science/Monitoring	**Compliance/Enforcement**
See general information for EC sites under the Azores, Madeira and Canaries Table. The UK will be responsible for ongoing research and monitoring. "The task of monitoring the effectiveness of the designation in ensuring	See general EC discussion in the Azores, Madeira and Canaries table. Darwin Mounds – The major issue of enforcing closures many miles from shore in areas fished by several nations remains to be resolved. The main method of monitoring the trawling closure will be through the

Site: Darwin Mounds - Scotland

that the site maintains, or is allowed to recover to a favourable conservation status will probably be carried out by the JNCC. This monitoring will allow Defra to ascertain whether the site designation is adequate to protect" coral habitat, in line with obligations under the EC Habitats Directive (Defra, Regulatory Impact Assessment, 2003).	satellite monitoring system that is being established for fishing vessels. Defra (Fishing division) will be involved in this in partnership with the European Commission (Caroline Turnbull, JNCC, email 2004).
Additional Comments	**Sources**
Similar trawling restrictions have recently been announced by the EC for areas around the Azores, Madeira and Canary Islands. The Darwin Mounds are within the UK's 200 nautical mile fishing zone, and fishing activity is controlled by the UK under the EC's Common Fisheries Policy (CFP). The primary UK government contact appears to be John Clorley, Department for Environment, Food and Rural Affairs, Zone 1/06a, Temple Quay House, 2 The Square, Temple Quay, Bristol BS1 6EB, Tel: 0117 372 8700, Fax: 0117 372 8508 Email: john.clorley@defra.gsi.gov.uk A possible EC contact is Armando Astudillo, EC Fisheries Directorate, Armando.Astudillo@cec.eu.int, who is listed as a contact in the Azores/Madeira/Canaries summary table.	EC Press Releases, Regulations and Reports (including ICES report) - Available at: http://europa.eu.int/comm/fisheries/ Defra, 2003. Darwin Mounds consultation package – Proposal, Regulatory Impact Assessment & Annexes. Available at: http://www.defra.gov.uk/corporate/consult/darwin-mounds/index.htm Joint Nature Conservation Committee (JNCC). (2003). "Government nature conservation advisers happy to see new EC regulation". www.jncc.gov.uk/communications/news/darwinmounds.htm AquaNews – Vancouver Aquarium Aquatic Environmental News Network – posted 02/04/04. http://www.vanaqua.org/ WWF News Releases - http://www.panda.org/news_facts/newsroom/ Contacts: Caroline Turnbull, Marine Strategy and Sites Assistant JNCC, caroline.turnbull@jncc.gov.uk Provided info on history, monitoring and management of the site. Other information was provided by email from the WWF – Peter Bryant (pbryant@wwfint.org), Stephan Lutter (lutter@wwfneap.org) and Alison Champion (Achampion@wwf.org.uk), the latter has been working most closely with the Darwin Mounds.


West Shetland Shelf
Faeroe Shetland Channel
Faeroe Bank Channel
Wyville-Thomson Ridge
'Darwin Mounds'
Rockall Trough
Hebrides Shelf



Key

Extent of mounds region mapped by AFEN

Limits of interpreted sidescan of Darwin Mounds East and West fields

Possible site boundary generated using simple point coordinates around the interest feature

2.2 km margin from region of mounds

Bathymetric contour © GEBCO Digital Atlas, British Oceanographic Data Centre on behalf of IOC and IHO 1994 & 1997.

Site: Oculina Bank - Florida

Size of Protected Area	Size in Relation to Known Coral Habitat	Type of Protected Area	Legislation
Entire Oculina Bank HAPC covers a total of 300 square statute miles. The Oculina Experimental Closed Area (OECA) within the Oculina Bank HAPC covers 92 nautical square miles. See more detailed coordinates below.	Most known habitat in the area is covered by the Oculina Bank HAPC, although 23 high relief *Oculina* pinnacles were discovered outside and to the west of the HAPC during a recent cruise.	Federal Fisheries Management Zone	*Magnuson-Stevens Fishery Conservation and Management Act* established the initial area on July 23, 1984. The HAPC was expanded July 14, 2000. An indefinite extension to the total fishing ban in the OECA was put into effect by NOAA and the South Atlantic Fishery Management Council (SAFMC) in the spring of 2004 (Final Rule - Amendment 13A to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region).

Corals/Ecosystems Protected	Rationale for Protection
Oculina varicosa is a branching ivory coral that forms giant but slow-growing, bushy thickets on pinnacles up to 30 m in height. The Oculina Banks, so named because they consist mostly of *Oculina varicosa*, exist in 50 to 100 m of water along the continental shelf edge about 26 to 50 km off of Florida's central east coast. Discovered in 1975, *Oculina* thickets grow on a series of pinnacles and ridges extending from Fort Pierce to Daytona, Florida (NOAA 2004). The Oculina Banks host a wide array of macro-invertebrates and fishes. They also are significant spawning grounds for commercially important species of food fishes including gag, scamp, red grouper, speckled hind, black sea bass, red porgy, rock shrimp, and the calico scallop.	Florida's Oculina Banks, once teeming with commercially important fish, appear to have severely depleted fish stocks. Much of the *Oculina* coral has been reduced to rubble, probably the result of a combination of destructive bottom trawling and natural causes like bio-erosion and episodic die-offs. In addition, it is widely known that anti-submarine patrols during World War II frequently and liberally employed underwater explosives in their search for German U-boats off the coast of Florida (MPA on-line fact sheet, MPA website (see below)). Such activity may have adversely affected the benthic habitat. Regardless of the cause, the Oculina Banks now support a drastically reduced fishery because most of the significant spawning grounds have been destroyed (NOAA 2004). The SAFMC believes the actions in Amendment 13A "provide the most biological, social and economic benefits while allowing for adaptive

Site: Oculina Bank - Florida

	management. The proposed regulations would continue to protect snapper-grouper populations, *Oculina* coral and associated habitat. Such extension would also provide a hedge against the scientific uncertainty associated with the status of some snapper-grouper species and reduce the possibility that these populations may fall below sustainable levels" (SAFMC 2004).
Zoning	**Restricted Activities**
None, although there are additional restrictions for the OECA over the Oculina Bank HAPC. These additional restrictions are largely focused on conservation of grouper and snapper.	In the Oculina Bank HAPC, no person may: (i) Use a bottom longline, bottom trawl, dredge, pot, or trap. (ii) If aboard a fishing vessel, anchor, use an anchor and chain, or use a grapple and chain. (iii) Fish for rock shrimp or possess rock shrimp in or from the area on board a fishing vessel. Within the OECA no person may fish for South Atlantic snapper-grouper in the experimental closed area, and no person may retain South Atlantic snapper-grouper in or from the area. In the experimental closed area, any South Atlantic snapper-grouper taken incidentally by hook-and-line gear must be released immediately by cutting the line without removing the fish from the water. Oil and Gas – the SAFMC has objected to proposed offshore exploration activities filed with the Minerals Management Service (MMS) off Florida and North Carolina based on the potential degradation or loss of extensive live bottom and other essential habitat. These activities were ultimately deemed inconsistent with state coastal zone management plans.
Planning/Management Process	**Effectiveness of Protective Measures**
Site authority includes entire water column including bottom features.	The extensive *Oculina* habitat damage observed in 1980 was found to be much worse by 1995 (Scanlon et al. 1999). The 1984 designation of

Site: Oculina Bank - Florida

Agencies Responsible for Site Management

National Oceanic and Atmospheric Administration (NOAA) - National Marine Fisheries Service (NMFS); South Atlantic Fishery Management Council.

Agencies Responsible for Enforcement of Laws and Regulations

NMFS, US Coast Guard

Relationship to Managed Areas Networks

This site is not part of a formal network of managed areas.

Role in Ecological Functioning of Other Sites

This site is not known to play an important role in the ecological functioning of other protected areas.

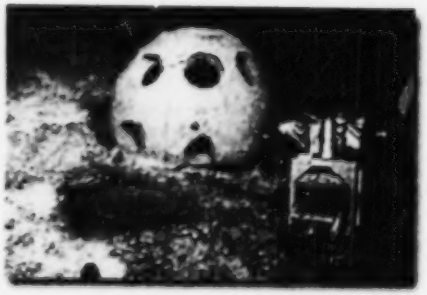
The proposed expansion in 2000 met with some opposition, particularly from the longline fishing industry, which feared that the new rule would be unduly burdensome. Some detractors argued that the proposed expansion included large areas that did not contain *Oculina* coral— only flat mud bottom habitat. They argued that restricting these areas would not help the coral habitat, but it would affect bottom longline fisheries for tilefish, grouper and shark.

However, NMFS reasoned that including the non-coral habitats within the HAPC would create "**buffer zones**" around the coral habitat. The buffer zones would reduce the likelihood of accidental incursions and would simplify enforcement. In addition, NMFS noted that previous rules established similar zones around areas fished by the rock shrimp and calico shrimp industries. The agency argued that the new rule would further streamline fishing regulations (MPA 2004). See SAFMC 2003, Appendix A for more information on the public consultation process for Amendment 13A.

the Oculina Bank as an HAPC closed the area to mobile fishing gear like trawls and dredges but fishermen could still anchor their boats and use weights to send baits to the bottom. In 1995, the SAFMC prohibited fishing vessels from dropping anchors, grapples, or attached chains in the HAPC. In 2000, the deep-water Oculina Marine Protected Area was extended to its present size (NOAA 2000 & 2004).

The National Marine Fisheries Service (NOAA Fisheries) has published a final rule for Amendment 13A to the Fishery Management Plan for the Snapper-Grouper Fishery of the South Atlantic. This rule extends regulations that prohibit fishing for and retention of snapper-grouper species within the OECA for an indefinite period, with a 10-year re-evaluation by the SAFMC. The SAFMC will also re-evaluate the configuration and size of the OECA within three years of the publication date of the final rule. The final rule will become effective April 26, 2004. As current measures do not expire until June 27, 2004, there will be no break in the closed period.

Site: Oculina Bank - Florida

Science/Monitoring	Compliance/Enforcement
Habitat Restoration Since 1995, scientists have been trying to re-establish the fragile, slow-growing *Oculina* corals by deploying concrete substrate to encourage colonization. In 1996, they began by deploying clusters of concrete "reef balls" throughout the reserve, hoping that the corals would attach, settle and grow. Some were deployed with live coral already attached, and some were deployed bare. Three years later, the scientists discovered that live coral remained on some of the balls. On others, the coral was stripped off, and only one reef ball deployed without coral attached showed coral recruitment (NOAA, Ocean Explorer, 2001).  In September 2001, a grouper shows interest in one of 105 reef balls a year after they were deployed on Oculina Bank. On the right is an arm of the submersible Clelia, used by scientists to examine progress in this effort to reestablish *Oculina* habitat and the associated fish and invertebrate communities. In 2000, a different type of reef ball—dome-shaped equipped with holes through which fish could swim—were deployed. The balls, which were similar in size and shape to an *Oculina* coral colony, were released with live coral attached. In the summer of 2001, explorers found that several fish species, including groupers, amberjacks, snappers, angelfish, butterflyfish and small basses, had colonized the structures—an encouraging sign of initial habitat restoration. Researchers also observed more gag and scamp grouper at the southern end of the EORR. Just 10 years ago, researchers saw no gag grouper, fewer than 10 scamp grouper, and very few amberjacks in the same area (NOAA, Ocean Explorer, 2001). Though too soon to tell how successful the	The press release announcing the 2000 extension to the site stated that violators will be prosecuted to the "fullest extent of the law". In spite of this strong wording, "lack of enforcement is one of the most common reasons cited by the public for not supporting continuation of the regulations within the Oculina Experimental Closed Area" (SAFMC 2003). As the site is isolated and relatively distant from shore (17 mi), consistent enforcement of the fishing and trawling ban has been difficult. Enforcement authorities are aware that illegal shrimp trawling occurs in the no-fishing zone. Though spotter planes and helicopters can survey the area, they cannot enforce the no-fishing zone restrictions alone. If they suspect illegal activity, they must alert U.S. Coast Guard surface vessels, which may not be available or in an advantageous position to respond immediately. Authorities believe that much of the illegal fishing activity occurs at night, making enforcement more difficult. Also, aerial surveillance missions often cannot distinguish between legal fishing activities, such as trolling for pelagic fish, and illegal anchoring and bottom fishing. Moreover, enforcement officers cannot determine or prove where fish were caught after a suspected boat returns to port (Reed (2001) cited in MPA 2004). To aid enforcement efforts, the SAFMC recently voted to require vessel permits and the use of vessel monitoring systems (VMS) in the calico scallop fishery south of the Georgia-Florida border. The VMS allows enforcement authorities to pinpoint a vessel's position in relation to the boundaries of the marine protected area (Reed, 2001). By using the VMS and conducting random surveillance missions of the protected area, as well as implementing educational efforts aimed at both commercial and recreational fishers, SAFMC hopes that self regulation will improve and the *Oculina* habitat eventually will recover (Reed, (2001) cited in MPA 2004).

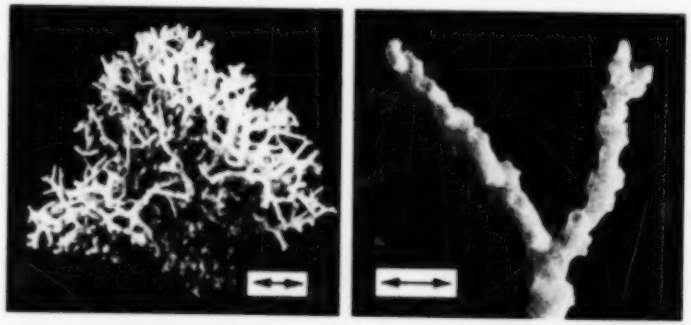
Site: Oculina Bank - Florida

coral re-establishment efforts will be, scientists are optimistic about their initial restorative efforts (MPA 2004) Other priorites for research include estimating fish abundance and community structure within various types of habitat including live *Oculina*; monitoring the distribution of intact and damaged habitat; bottom and surface current monitoring to determine the import and export of larval fish from the closed area; and to determine the contribution of fish from the Oculina HAPC to fisheries in adjacent waters.	
Additional Comments	**Contacts/Web Sites**
Other useful sources of information include: • Scanlon, K.M., P. R. Briere, and C.C. Koenig. 1999. Oculina Bank: Sidescan Sonar and Sediment Data from a Deep-Water Coral Reef Habitat off East-Central Florida. Open-File Report 99-10. U.S. Geological Survey, Woods Hole, MA. http://pubs.usgs.gov/of/1999/of99-010/htm/einterp.htm#Koenig The information obtained for this site was adequate for completing this table, however for any future inquiries, Julie Weeder, NOAA, would be the appropriate contact – julie.weeder@noaa.gov	United States MPA on-line Fact Sheets, which can be found at http://www.mpa.gov/inventory/inventory.html. The most informative Fact Sheet is entitled "What Is an MPA? - Experimental Oculina Research Reserve", (referenced above as MPA 2004) http://mpa.gov/what_is_an_mpa/oculina.html#Reed). Maps of the Oculina closure are available in the on-line U.S. inventory atlas: http://www.mpa.gov/inventory/atlas/sa/southatl.html NOAA. 2000. NOAA Fisheries Approves Expanded Boundaries for Protected Habitat Area Off Florida's East Coast to Protect Oculina Coral. NOAA Press Release 00-R128, June 26, 2000. NOAA. 2004. Deep Water Coral Reefs. NOAA Fact Sheet available at http://www.coris.noaa.gov/about/deep/deep.html SAFMC. 2004. NOAA Fisheries Publishes Final Rule - Oculina Closure Extended. Press Release, March 30, 2004. http://caldera.sero.nmfs.gov SAFMC. 2003. Final Amendment 13A to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. October 2003. Charleston SC.

Detailed coordinates for the Oculina Bank HAPC, experimental closed area, and satellite areas follow (see U.S. MPA inventory website referenced above for maps that illustrate these coordinates):

- The Oculina Bank HAPC encompasses an area bounded on the north by 28° 30' N. lat., on the south by 27° 30' N. lat., on the east by the 100-fathom (183-m) contour, as shown on the latest edition of NOAA chart 11460, and on the west by 80° 00' W. long.

- Two adjacent satellite areas (three square nautical miles each): the first bounded on the north by 28° 30' N. lat., on the south by 28° 29' N. lat., on the east by 80° 00' W. long., and on the west by 80° 03' W. long.; and the second bounded on the north by 28° 17' N. lat., on the south by 28° 16' N. lat., on the east by 80° 00' W. long., and on the west by 80° 03' W. long.
- The experimental closed area is bounded on the north by 27° 53' N. lat., on the south by 27° 30' N. lat., on the east by 79° 56' W. long., and on the west by 80° 00' W. long.



Two images of the deep-sea coral *Oculina varicosa*. The image on the left shows the complex growth structure of a small colony. On the right is a closeup of an individual branch. Photo: John Reed, 2002a.

Site: New Zealand Seamounts

Size of Protected Area	Size in Relation to Known Coral Habitat	Type of Protected Area	Legislation
The 19 seamounts selected for closure are distributed around New Zealand's Exclusive Economic Zone (EEZ) ranging from depths of 220 m to 1750 m, including the Chatham Rise, sub-Antarctic waters, the east and west coasts of the northern part of the North Island. They are representative of the types of seamounts found in New Zealand waters. The closed seamounts vary in size from the very large "Bollons" seamount in the sub-Antarctic, to the very small features on the Chatham Rise (see map below).	Protection is afforded to 19 out of 870 known seamounts occurring within the New Zealand EEZ (not all have corals, some are thermal vents).	Bottom trawl closure	*NZ Fisheries Act (1976)*

Corals/Ecosystems Protected	Rationale for Protection
More than 105 species of coral have been identified so far in the New Zealand EEZ, from the tropical waters of the Kermadec Islands, to the temperate waters south of the South Island. More were found during a New Zealand and Australian expedition to Norfolk Island in 2003. Deepwater black corals (antipatharians) and horny corals (gorgonians) are most abundant near the peaks of seamounts where the mean current is greatest. Recent surveys of seamounts suggest that there is a high level of endemism among seamounts in the Tasman Sea and southeast Coral Sea. More than 30 species have been identified as endemic to seamounts in the New Zealand EEZ. Many of these endemic species are antipatharian and gorgonian corals (Smith Undated).	Rationale provided by the Department of Fisheries is to avoid, remedy, and mitigate the adverse effects of fishing on aquatic life associated with the seamounts. Existing research shows that marine life on seamounts is diverse, with a number of species which are long-lived, slow-growing and slow to reproduce. Many are potentially vulnerable to the impact of trawl fishing methods. The closures will give marine scientists the opportunity of learning more about the biological diversity of these deepwater habitats and ecosystems.

Site: New Zealand Seamounts

Seamounts also harbour populations of commercially exploited orange roughy, black oreo and smooth oreo.	
Zoning	**Restricted Activities**
None for the existing protected seamounts.	The 19 seamounts are closed to all trawling. While all of the seamounts closed have the potential to be fished, most have had little or no fishing history. The closure of a few seamounts that have been fished opens the possibility of comparative research on the environmental impact of fishing. The Ministry of Fisheries has worked with the Ministry of Economic Development, Crown Minerals, to resolve some implications relating to the seamount closures for a particular prospecting application. It remains theoretically possible for seamounts to be closed for fishing and yet remain open for prospecting under the *Continental Shelf Act*. This issue points to a lack of integration in the policy framework and a reliance on the goodwill of officials to resolve policy gaps (Willis et al. 2002). Management measures need also to be enacted under the Continental Shelf Act 1964 to prohibit or restrict mineral exploration on specific seamounts (Smith Undated).
Planning/Management Process	**Effectiveness of Protective Measures**
The chosen seamounts were identified by the National Institute of Water and Atmospheric Research (NIWA) according to a draft seamount management strategy developed by the Ministry of Fisheries. They are either representative of others in their area - in their geology or biology, for example - or are unique features in New Zealand waters. Their ecological importance, vulnerability, "naturalness" and research status have also been taken into account. All 19 seamounts are outside the 12 nautical mile coastal zone and within the New Zealand Exclusive Economic Zone (EEZ). They are spread throughout the EEZ and their peaks range in depth from 220 m	Not known, however proposed research planned for 2004 to 2006 will survey fished and unfished seamounts and may undertake follow-up studies of seamounts that have previously been surveyed.

Site: New Zealand Seamounts

to 1750 m. The shallowest peak is Rumble III, an active volcano north-east of the North Island. The deepest are the unnamed Seamount #140, north-west of Cape Reinga and Seamount #328, south-east of the Chatham Islands, both at 1750 m depth. An objective of the New Zealand Biodiversity Strategy (NZBS) is to expand the network of marine protected areas (using marine reserves and other forms of legal protection) so that it fully represents the range of New Zealand's coastal and marine ecosystems and habitats. By 2010, it is hoped to have protected 10 per cent of the marine environment (New Zealand Biodiversity Website). The Marine Protected Areas network will comprise areas protected by a range of management measures including marine reserves, fisheries regulations, and areas protected under the Resource Management Act (May 29, 2003 Press Release). The "Draft Strategy to Address the Impacts of Fishing on Seamounts (December 1999)" is a strategy to manage the impacts of fishing on a representative sample of seamounts within New Zealand's fisheries waters. The aim of the management measures is to "take steps to towards ensuring sustainability of seamount ecosystems while providing for utilization, maintaining biodiversity, and meeting the foreseeable needs of future generations". The strategy is "directed solely at the impacts of fishing on seamounts" (Willis et al. 2002). The Ministry of Fisheries is proposing to implement the strategy on an incremental basis through their sustainability measures processes. This is a centralized decision making process where the Minister of Fisheries makes sustainability decisions based on advice from Ministry staff. The Minister has endorsed the strategy and made decisions to close seamounts to fishing on the basis of the strategy (Willis et al. 2002). See Willis et al. (2002) and the "Draft Strategy for Managing the Environmental Effects of Fishing" (see website below) for additional information.	

Site: New Zealand Seamounts

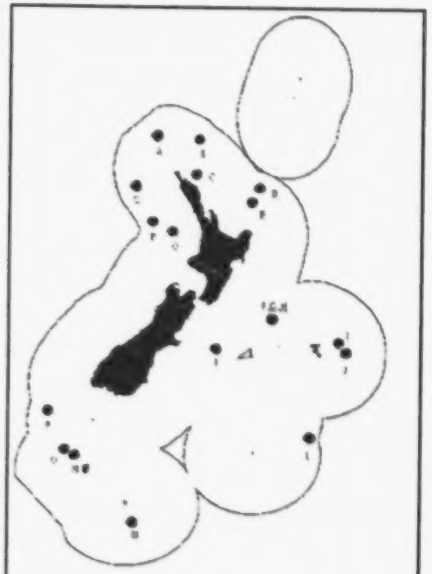
Science/Monitoring	Compliance/Enforcement
A major cooperative seamount survey between Australia and New Zealand (NORFANZ) did not sample any of the closed seamounts. On that survey a variety of sampling gear was used, including commercial-sized trawls, and it was deemed appropriate to avoid the closed seamounts with the gear the closures were designed to protect against. The objectives of that project were general biodiversity in the region, rather than specific seamounts (M. Clark, email 2004). The National Institute of Water and Atmospheric Research (NIWA) has initiated a research program to develop effective mitigation and protection strategies to maintain healthy, diverse, and resilient seamount ecosystems and sustainable use of their resources. The program has two objectives: 1. Describing seamount ecosystem characteristics. A seamount inventory has been developed and is constantly being added to as new information becomes available on the physical, biological, and hydrographic features of seamounts in the New Zealand region. Research surveys are also carried out to describe habitats and faunal assemblages associated with seamounts in order to improve knowledge of biodiversity and seamount resources. This work will build towards understanding the functioning and dynamics of seamount ecosystems. 2. Determining the interaction between seamount habitat and fisheries. A large proportion of the New Zealand deepwater fishery catch of species, like orange roughy, comes from seamounts. NIWA is trying to establish how bottom trawling affects the habitat and associated benthic fauna, and what this might mean to the long-term sustainability of both the fisheries and the seamount biodiversity. The NIWA seamounts program has sampled several of the closed	No specific information other than a reference in Willis et al. (2002) that "enforcement of these closures is addressed through the general enforcement provisions of the *Fisheries Act*".

Site: New Zealand Seamounts

seamounts, using a small epibenthic sled, and photographic equipment. There are short reports available on the general findings of the surveys (M. Clark email 2004). The NZ Ministry of Fisheries has proposed the following research between 2004 and 2006: • developing a Seamount Database and Atlas that will describe the known physical and biological attributes, and fishing history associated with each known seamount and allow production of maps of seamounts within the NZ EEZ; • undertaking a similarity analysis to explore whether seamounts can be grouped according to certain characteristics; • increasing the information available for seamounts by deriving information from various data sources (such as bathymetry, broad scale satellite data on current patterns, water temperature etc); and • monitoring the changes to seamount biodiversity after fishing has ceased to better understand rates of recovery.	
Additional Comments	**Contacts/Web Sites**
Fisheries stakeholders, including the fishing industry and NGOs, were consulted during development of the seamount strategy as follows: In August 1999 the Ministry of Fisheries released a draft strategy as a discussion document. This was revised and reissued in December 1999, following stakeholder submissions on the earlier draft. Following further submissions on the December draft, the Ministry held a stakeholder workshop in April 2000 to discuss the draft strategy, where it is understood that stakeholders still expressed major concerns with the draft strategy. There has, however, been no closure on this consultation because the Ministry has not provided stakeholders with any feedback on the issues raised at the April 2000 workshop. Consequently stakeholders do not know whether or not their comments have been addressed and the strategy remains in draft form. No new version has been released to stakeholders since the December 1999	Ministry of Fisheries Press Releases, September 7, 2000, May 10, 2001 and May 29, 2003. Available at: http://www.fish.govt.nz/current/pressreleases.html Ministry of Fisheries. Draft Strategy for Managing the Environmental Effects of Fisheries. Available at: http://www.fish.govt.nz/sustainability/management_strategy/index.html Ministry of Fisheries. 2004. Statement of Intent Proposed Fisheries Research Services for 2004/05. Draft for Consultation, Wellington NZ. pages 175-177. Available at: http://www.fish.govt.nz/current/soi-consultation/index.html See also: http://www.fish.govt.nz/sustainability/index.html NIWA website: www.niwa.co.nz

Site: New Zealand Seamounts

draft. There is still considerable opposition from the commercial fishery (Willis et al. 2002). Brodie and Clark (2002) discuss the seamount strategy in their article: Brodie, S. and M. Clark. 2002. The New Zealand Seamount Management Strategy – Steps Towards Conserving Offshore Marine Habitat. In: Aquatic Protected Areas: What works best and how do we know? Proceedings of the World Congress on Aquatic Protected Areas, Cairns, Australia – August 2002.	Information on research programs and coral protection for the 19 seamounts was provided by email from Dr Malcolm Clark Principal Scientist, Deepwater fisheries, NIWA, Private Bag 14-901, Kilbirnie, Wellington, New Zealand, Tel: 64-4-386 0300 Fax: 64-4-386 0574, email: m.clark@niwa.co.nz. New Zealand Biodiversity Website: http://www.biodiversity.govt.nz/seas/biodiversity/index.html Willis, G., Gunn, J., and D. Hill. 2002. Oceans Policy Stocktake. Prepared for the Oceans Policy Secretariat, Department of the Environment. Report MfE976. http://www.oceans.govt.nz/media-publications/public-documents/stocktake/report.pdf Smith, P.J. Undated. Managing Biodiversity: Invertebrate By-Catch in Seamount Fisheries in the New Zealand Exclusive Economic Zone. NIWA, Wellington, NZ. http://www.worldfish.org/bm_participants.html On the government policy/science side, Dr. Clark suggested Julie Hills (Julie.Hills@fish.govt.nz) who has responsibility for seamounts (not contacted for this table).



Seamount Map

KEY:

A =	#140
B =	#148
C =	Cayalli
D =	Brothers
E =	Rumble 3
F,G,H =	Morgue, Pyre, Gothic
I =	Diamond Head
J =	#328
K =	Pinnie
L =	Bollons (A)
M =	#401
N =	Christable
O =	#375
P =	#358
Q =	Aotea
R =	Telecom
S =	#447

Site: Norway – Røst Reef, Sula Ridge, Iver Ridge, Tautra Ridge, Tisler Reef

Size of Protected Area	Size in Relation to Known Coral Habitat	Type of Protected Area	Legislation
Røst: The area is about 43 km long and 6.8 km wide; see coordinates below. **Sula, Iver, Tisler:** See coordinates below. **Tautra Ridge:** 0.5 km^2, also known as the Selligrunnen nature reserve.	Røst: Entire reef within protected area – protected area includes at least a 5 km buffer to protect against fishing gear which could touch the bottom. This is typical for the other sites.	Ban on bottom trawling for four sites. The Norwegian Directorate of Nature Management designated a small marine reserve to protect the Tautrarygg coral reef (Tautra Ridge). It was the world's first MPA to protect cold-water coral (MPA News 2001).	Series of Amendments to *The Regulations Relating To The Protection Of Coral Reefs* (March 1999) pursuant to sections 1 and 4 of the *Act of 3 June 1983 No. 40 relating to sea-water fisheries, etc* and section 4 of the *Act of 17 December 1976 No. 91 relating to the Economic Zone of Norway*, cf. section 13 of the *Royal Decree of 13 May 1977 relating to fishing and hunting operations by foreign nationals in the Economic Zone of Norway*

Corals/Ecosystems Protected	Rationale for Protection
Røst: Large *Lophelia pertusa* reef off Røst in Lofoten. The reef is 35 km long, 3 km wide and lies mainly between 300 and 400 m depth at a steep and rugged zone of the continental break. The reef at Røst is about 10 times larger than the Sula reef (IMR 2003). It is the world's largest known cold water reef (WWF Fact Sheet, Undated). **Sula:** The Sula Ridge consists of numerous *Lophelia pertusa* banks at a depth of 280-300 m. The Sula reef complex is about 13 km long, the single reefs being of up to 1 km size. It is up to 35 m high and 700 m wide. **Iver Ridge:** The Norwegian *Lophelia* reef most damaged by trawling; **Tautra Ridge, Tautrarygg reef:** The Tautrarygg reef is the world's shallowest growing *Lophelia* reef at 40 m depth.	Simultaneously with the "spectacular video pictures" of coral reefs provided by the Norwegian State Oil Company, "Statoil", fishermen were expressing their concerns on the effects of trawling on the reefs. They claimed that corals had disappeared from trawling grounds and that their catches in these areas had diminished. Their worries also concerned the likely function of the reefs as nursery areas for fish (IMR Press Release). The Norwegian Institute of Marine Research has shown that *Lophelia* reefs situated in heavily trawled areas are threatened, some of which close to extinction. The diversity of habitats represented by the reefs, and both national and international commitments to protect biodiversity were also reasons for protecting Norway's reefs (Lekven 2004).

Site: Norway – Røst Reef, Sula Ridge, Iver Ridge, Tautra Ridge, Tisler Reef

Tisler: Discovered and mapped in the summer of 2002, the 1.2 km long (200 m wide) Tisler Reef lies along the Norway-Sweden border at 74 to 155 m depth. Thought to be more than 1000 years old, it is the only known reef for yellow *Lophelia* corals.	
Zoning	**Restricted Activities**
None for any of the sites, including Tautra Ridge.	Fisheries: The regulations above state: • "Special care must be shown during fishing operations near known coral reefs. Deliberate damage to such reefs is prohibited." • "Within the areas specified in section 3, it is prohibited to carry out fishing operations using gear that is towed during fishing and that may touch the sea floor in this connection." • "These prohibitions apply both to Norwegian and to foreign fishing vessels." Oil and Gas: The Røst Reef lies within the "Nordland VI" petroleum block, which is regarded as a promising field by oil and gas companies. No licences were granted in this block during a recent licensing round as the Norwegian Ministry of Oil and Energy felt a need for more information before allowing further petroleum activities in this sensitive area, including possible measures to protect coral reefs (letter to WWF-Norway, 10 May 2002 cited in the WWF Fact Sheet, The Røst Reef – A Potential MPA). "Development of the oil- and gas-industry, placement of pipelines and other structures, etc., may also cause conflicts in relation to the protection of such reefs, and without rejecting or underestimating the potential damage in this context, one may say that placement of pipelines and other structures is an activity which can be considered to be a one-time activity in partial transects of an area, and may as such have less potential of damaging coral reefs compared to fishing" (Lekven 2004).

Site: Norway – Røst Reef, Sula Ridge, Iver Ridge, Tautra Ridge, Tisler Reef

	Tautra Ridge: All potentially damaging activities – including anchoring, dredging, laying of pipe, or sampling of coral or coral-affixed organisms -- are banned at the site (MPA News 2003).
Planning/Management Process	**Effectiveness of Protective Measures**
Norway has taken specific action to protect several reefs from harmful bottom-trawling. Furthermore, a national 'Marine Conservation Plan' is under development to ensure improved protection of corals and other valuable marine habitats (WWF "Gift to the Earth" Fact Sheet, 2003). Many different activities may be potentially harmful to coral reefs. Recognizing this, a Working Group in Norway recently suggested, as a principle of the precautionary approach, that the legal basis for the protection of coral reefs should be broadened to include these activities. The competent authority will be given the necessary legal instruments to prohibit any activity which may have harmful effects on coral reefs in one or more specific areas (Lekven 2004). The Tautra Ridge is a nature reserve and is temporary protected waiting for the establishment of a network of MPAs in Norway in which this area will most likely be a part (to be established in 2007-hopefully). As part of this work it has been suggested to enlarge the existing reserve (Eva Degre, email, 2003). The normal procedure for public consultation is to send the suggested regulatory measures to the parties involved and to ask for written comments. During the public consultation process the Norwegian Fishermen Association was also given the opportunity to provide written comments on the suggested regulatory measures and in particular comment on the extent of the protected areas (Lekven 2004).	Norway has not yet assessed the effectiveness of the protective measures however they have not received any reports or indications of breaches of the regulatory measures (Lekven 2004).

Site: Norway – Røst Reef, Sula Ridge, Iver Ridge, Tautra Ridge, Tisler Reef

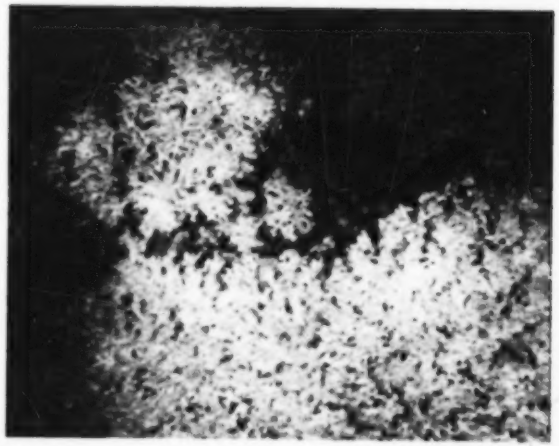
Science/Monitoring	Compliance/Enforcement
Coral research at IMR has included: • Detection and mapping of reefs • Reef assessment, e.g. impacts from fisheries • Description of reef morphology • The biology of *Lophelia*, e.g. growth • The ecology of *Lophelia* reefs, e.g. associated biodiversity including fish The IMR has been registering and monitoring coral reefs on annual cruises since 1997, exclusively within the southern part of the Norwegian shelf. Using multi-beam bathymetry and ROV, nearly 1400 **possible** *Lophelia* reefs have been mapped. All confirmed observations of coral reefs are gathered in a data base and close to 800 coral reefs were registered by early 2003 (IMR Website). Mapping coral reefs is very time consuming and rather expensive. Therefore mapping of coral reefs is still expected to take many years (Lekven 2004). The IMR has emphasized the development of mapping techniques and assessment of the reefs because large reefs have been at risk of extinction due to bottom trawling. Sampling of living corals has also been undertaken for the purpose of studying the biology and ecology of *Lophelia* (IMR Website).	As taken from the regulations above: **Penal measures** "Any willful or negligent contravention of the provisions of these regulations is subject to a penalty pursuant to section 53 of the Act of 3 June 1983 No. 40 relating to sea-water fisheries and section 8 of the Act of 17 December 1976 relating to the Economic Zone of Norway." **Confiscation** "In the event of contravention of the provisions of these regulations, confiscation may be effected pursuant to section 54 of the Act of 3 June 1983 No. 40 relating to sea-water fisheries and section 9 of the Act of 17 December 1976 relating to the Economic Zone of Norway." It is expected that the Coast Guard will survey the areas, as is the case with any other protected area in the Norwegian Economic Zone. Vessels over 24 m in length may be traced through a tracking system introduced in Norway some years ago (Lekven 2004).
Additional Comments	**Contacts/Web Sites**
	Norwegian Institute of Marine Research website: www.imr.no WWF Website: www.panda.org – MPA Fact Sheets and press releases. Information on the Tautra Reserve was provided by Eva Degre, Directorate for Nature Management, Norway, 7485 Trondheim Norway, tel: +47 73580740/fax +47 73580501, email: eva.degre@dirnat.no.

Site: Norway – Røst Reef, Sula Ridge, Iver Ridge, Tautra Ridge, Tisler Reef

	Mr. Egil Lekven, at the Norwegian Directorate for Fisheries, egil.lekven@fiskeridir.no, provided a copy of a brief, but informative presentation he made in April 2004 on regulatory measures for coral reefs in Norwegian waters – referenced above as Lekven (2004).

Location – Røst:

67° 36.2' N, 009° 32.9' E
67° 33.8' N, 009° 40.2' E
67° 17.3' N, 008° 57.1' E
67° 19.8' N, 008° 49.5' E



Sula Ridge: The Sula Ridge, comprising the Sula Reef, is situated off the west coast of mid-Norway, in a trough between the Frøya Bank to the southwest and the Halten Bank to the northeast at ca. 64° N and 8° E. The ban on bottom trawling covers the area bounded by:

64° 18.0' N; 07° 53.0' E
64° 10.5' N; 08° 17.0' E
63° 52.5' N; 07° 51.5' E
64° 00.0' N; 07° 26.0' E

Iver Ridge:

64° 50.0' N; 09° 00.0' E
64° 55.0' N; 09° 30.0' E
65° 10.0' N; 09° 30.0' E
65° 10.0' N; 09° 10.0' E

Tisler Reef:

59° 00.15' N; 10° 57.20' E
58° 59.70' N; 10° 57.20' E
58° 59.25' N; 10° 59.10' E
58° 59.85' N; 10° 59.10' E

Tautra Ridge or Selligrunnen nature reserve:

63° 36.2' N; 10° 30.6' E
63° 35.9' N; 10° 31.7' E
63° 35.7' N; 10° 31.2' E
63° 36.0' N; 10° 30.1' E

Site: Tasmanian Seamounts Marine Reserve - Australia

Size of Protected Area	Size in Relation to Known Coral Habitat	Type of Protected Area	Legislation
38,894 ha. See map below showing boundaries and coordinates for corner points.	15 out of approximately 70 seamounts as a representative sample. Turbidity from the trawling of adjacent areas "was a consideration in the design of the reserve and the boundaries have been located to minimize the possibility of indirect impact" (excerpt from Management Plan).	Marine Reserve also referred to as a Commonwealth Reserve.	The Tasmanian Seamounts Marine Reserve was declared under the *National Parks and Wildlife Conservation* (NWPC) *Act 1975*. The Management Plan came into effect under the *Environment Protection and Biodiversity Conservation* (EPBC) *Act 1999* which replaced the NPWC Act.

Corals/Ecosystems Protected	Rationale for Protection
About 70 seamounts rise from water depths of between 1000 and 2000 m on the continental slope, between 50 and 170 km off southern Tasmania. Remnants of extinct volcanoes, these seamounts are typically cone-shaped, 20 to 500 m high and several kilometres across at their base. The benthic communities of the Tasmanian Seamounts can be divided into two principal types: coral and urchin-dominated communities. The coral-dominated community is characterized by a matrix of living and dead colonial hard coral (*Solenosmilia variabilis*) and is generally found on shallower seamounts in the Reserve (< 1400 m). This type of community supports a high diversity of species. The dense coral matrix provides a platform for filter feeders, such as hydroids and sponges, solitary stony corals as well as black, gold and bamboo corals. The coral matrix also provides shelter for a wide variety of animals such as crabs, lobsters, sea spiders, seastars, brittlestars and small fish such as deep-sea cod. The deeper seamounts are dominated by sea urchins. While the deeper seamounts also support a variety of invertebrates, there are fewer	This field of seamounts is a distinctive geological feature not known elsewhere on the continental margin of Australia. Research has found a high proportion of species (24-43%) new to science. At least 8 genera new to science have been discovered. Lightly fished seamounts (the deeper seamounts) are species diverse and pristine. The heavily fished, shallower Tasmanian seamounts exhibit a benthic biomass significantly lower than seamounts in lightly fished or unfished areas, and significant areas where reef aggregate and associated flora and fauna has been removed from the slopes or turned to rubble. The strategic objectives for the reserve include: • Protect the unique and vulnerable benthic communities of the seamounts; • Protect the conservation values of the Reserve from human induced damage; • Manage the Reserve as part of the National Representative System of Marine Protected Areas (NRSMPA); • Contribute to the protection of the overall conservation values

Site: Tasmanian Seamounts Marine Reserve - Australia

species groups and a lower benthic biomass. The deeper seamounts (> 1400 m) typically contain large quantities of dead *S. variabilis* that other organisms could use for attachment or for shelter. The survey of fourteen Tasmanian seamounts found species-richness to be high in global terms with 279 species located comprising 242 species of invertebrates and 37 species of fish. See attachment 2 of Management Plan for a detailed preliminary species list.	of the southern Tasmanian seamounts' ecosystem; and • Use as a research site to increase knowledge of seamount ecosystems generally and the endemic species of the southern Tasmanian seamounts. Four steps in choosing and designing marine protected areas: 1. Scientific Assessment 2. Stakeholder consultation 3. Socio-economic assessment 4. Conservation objectives See "Establishing new Commonwealth marine protected areas" for further details (website below). The Commonwealth Marine Protected Areas Stakeholder Reference Group is the main forum for consultation with non-government organisations on the broad range of issues relating to the identification and management of marine protected areas. The Commonwealth Marine Protected Areas Committee is the main forum for consultation between the Department of the Environment and Heritage and other government agencies.
Zoning	**Restricted Activities**
The Reserve is divided into two management zones. Each of these zones has different objectives and allows different activities. The Highly Protected Zone runs from a water depth of 500 m to 100 m below the sea-bed and is managed to protect the integrity of the benthic ecosystem. The Managed Resource Zone stretches from the ocean surface to the depth of 500 m. Its aim is to ensure long term protection and maintenance of biological diversity while allowing the tuna longline industry access to the surface waters. The vertical zoning system was	Fishing for southern bluefin tuna, eastern tuna and billfish using pelagic longline methods may be carried out in Managed Resource Zone in accordance with fishing concessions issued by the Australian Fisheries Management Authority (AFMA) under the Fisheries Management Act 1991. Other non trawl commercial fishing subject to a permit from the Director of National Parks. Bottom trawl fishing prohibited. No fishing or petroleum or mineral exploration allowed in Highly Protected Zone. No other access to Highly Protected Zone without a permit. A permit may be required for other activities (see Planning/Management below).

Site: Tasmanian Seamounts Marine Reserve - Australia

based on the principle that effective management of a southern Tasmanian seamount MPA clearly should be based on an IUCN Category 1 reserve below 500 m. However, the available evidence indicates that fishing within the upper 500 m is unlikely to have a significant impact on the seamount-associated community, so a Category VI reserve may be maintained for the upper waters without adversely affecting the conservation value of the deepwater seamount reserve.	Mines and petroleum prospectivity is low, therefore there is unlikely to be any interest in exploratory activities.
Planning/Management Process	**Effectiveness of Protective Measures**
Prohibitions – see "restricted activities" above. See "Rationale for Protection" for information on site selection and goals for the reserve. Permits: Required for research, commercial and certain recreational activities in a Commonwealth park or reserve, including Commonwealth marine parks and reserves. Activities must be consistent with the Management Plan. "Commercial" activities include tours, filming, photography and "other" activities. (see website below). A permit may be issued for an activity in Commonwealth reserves only if the activity is not likely to: • endanger public safety; • unduly damage the reserve; • unduly interfere with the preservation or conservation of biodiversity or heritage in the reserve; • unduly interfere with the protection of other features or facilities in the reserve; • interfere with the privacy of a cultural event held in the reserve by the traditional owners of indigenous people's land in the reserve; • interfere with the continuing cultural use of the reserve (including residence in the reserve) by the traditional owners of indigenous people´s land in the reserve; or	No information available, but likely not known due to the recent designation of the sites and lengthy period required for recovery. A study in 2002 indicated no significant fishing impact on the benthic environment (Mednis, email, 2004). The Management Plan states a need to monitor the efficacy of benthic ecosystem protection from adverse human impacts through a follow-up survey (indicators could include health of benthos i.e. growth, recruitment and maintenance of genetic diversity, water quality, turbidity and vessel movements). This study has yet to be undertaken (Mednis, email, 2004).

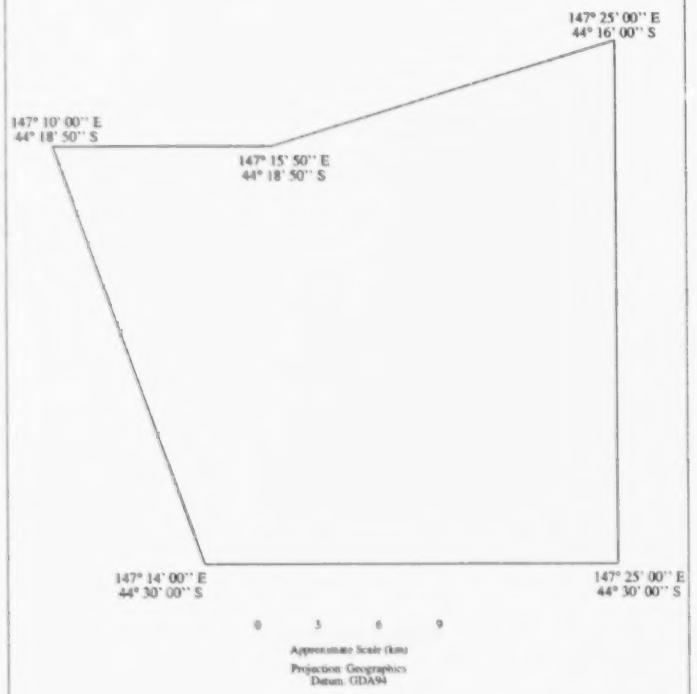
Site: Tasmanian Seamounts Marine Reserve - Australia

• interfere with the privacy of other persons in the reserve.	
Science/Monitoring	**Compliance/Enforcement**
This is no research being undertaken as part of the management of the reserve. Environment Australia (also known as the Department of the Environment and Heritage) has hired a consultant to develop a broader research and monitoring strategy for marine protected areas throughout Australia including the Tasmanian Seamounts (Mednis, email 2004). The Management Plan recommends the development of a research and monitoring program for the Reserve; also the selection and monitoring of indicators of health of benthos (growth, recruitment, maintenance of genetic diversity). Performance indicators for managing the pelagic fisheries may include the number of licenses issued, catch and bycatch records and presence of fishing debris on seamounts. Recent research expeditions include two major seabed swath mapping and geophysical surveys in the South East Marine Region in 2000 and the release of a report in 2002 entitled "A Trophodynamic Model for the Tasmania Seamounts Marine Reserve: Links Between Pelagic and Deepwater Ecosystems". The study concluded that there were negligible impacts on benthic communities from fishing in the pelagic zone, given very low levels of fishing and that the velocities of deep water currents were high enough to bring sufficient supplies of prey to the seamount's demersal fish population to sustain them (Mednis, email, 2004).	Aerial surveillance requested by Environment Australia and limited arrangements with other departments such as Fisheries (Mednis, email, 2004). Environment Australia will develop a compliance and enforcement plan for the Reserve, which includes: • working with AFMA to determine compliance and enforcement arrangements relating to pelagic fishing and trawling; • working with other Commonwealth agencies including Customs and Defence to monitor the level of fishing and other boating activity; • maximize voluntary compliance through involvement and education; and • surveillance flights over the Reserve.
Additional Comments	**Sources**
Marine Reserve proclaimed May 9, 1999; Management Plan Gazetted June 26, 2002. The Tasmanian Seamounts occur in the South East Region of Australia, which is currently in the process of finalizing a Regional Management Plan as part of the broader 1998 Australian Ocean Policy.	Tasmanian Seamounts Marine Reserve Website: http://www.deh.gov.au/coasts/mpa/seamounts/ Management Plan, maps and summary fact sheets, Australian Government - Commonwealth Parks and Reserves Permits: http://www.deh.gov.au/epbc/permits/parks/index.html

Site: Tasmanian Seamounts Marine Reserve - Australia

This plan may improve research, monitoring and management of the Tasmanian Seamounts (Mednis, email, 2004).	"Establishing New Commonwealth Marine Protected Areas," website: http://www.deh.gov.au/coasts/mpa/commonwealth/establish/index.html Additional information was provided by Astrida Mednis, Marine Protected Areas Section, Department of the Environment and Heritage (DEH), email astrida.mednis@deh.gov.au, phone (02) 6274 2751; fax (02) 6274 1771.

Tasmanian Seamounts Marine Reserve



Legend:

Tasmanian Seamounts Marine Reserve

The reserve is divided into two vertically stratified zones: a Highly Protected Zone from a depth of 500 metres below sea level to 100 metres below the seabed, and a Managed Resource Zone from the sea surface to a depth of 500 metres.

Sources:
Geoscience Australia (2001): Australian Maritime Boundary Information System (AMBIS)
Environment Australia (2001): Commonwealth Marine Protected Areas Managed by EA

Caveat: Data are assumed to be correct as received from the data suppliers

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June 2002

Environment Australia

Location of Tasmanian Seamounts Marine Reserve

LEGEND

Australian Exclusive Economic Zone (EEZ) and Territorial Sea

Tasmanian Seamounts Marine Reserve

Caveat: Data is assumed to be correct as received from the data suppliers

Sources:
Geoscience Australia (2001): Australian Maritime Boundary Information System (AMBIS).
Environment Australia (2001): Marine Protected Areas Managed by EA
ABS (1991): Populated Places (1991) Australia.
Geoscience Australia (1998): TOPO-2.5M Topographic Data.

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Environment Australia